CLAIMS

1. A method (1) of restoring partials of a sound signal during harmonic analysis in which the sound signal is divided into time frames to which time/frequency analysis is applied that supplies successive short-term spectra represented by sample frequency frames, the analysis further consisting in extracting spectrum peaks in the frequency frames and linking them together over time to form partials, the method of restoring a partial between a peak P_i and a peak P_{i+N} whose frequency and phase are known being characterized in that it comprises the steps of:

· estimating (2) the frequency $\hat{\omega}$ of each of the missing peaks P_{i+1} to P_{i+N-1} of this partial;

· calculating (3) the phase $\hat{\varphi}$ from peak to peak, from the phase of the peak P_i to that of the peak P_{i+N}, for all the frequencies $\hat{\omega}$ previously estimated;

· calculating (4) the phase error $err\varphi$ between the calculated phase $\hat{\varphi}$ and the known phase at the same peak P_{i+N};

· correcting (5) each calculated phase $\hat{\varphi}$ by a value that is a function of the phase error $err\varphi$.

2. A method (1) according to claim 1 for restoring partials of a sound signal, wherein the phase $\hat{\varphi}$ is calculated from the following formula, in which φ_i and $\hat{\omega}_i = \omega_i$ are the phase and the frequency of the peak P_i and φ_{i+N} and $\hat{\omega}_{i+N} = \omega_{i+N}$ are the phase and the frequency of the peak P_{i+N}:

$$\hat{\varphi}_{i+n} = \mathrm{mod}\left(\varphi_i + \sum_{j=1}^{n} \frac{\hat{\omega}_{i+j} + \hat{\omega}_{i+j-1}}{2} T, 2\pi \right), \quad n = 1,\ldots,N$$

3. A method (1) according to claim 1 or claim 2 for restoring partials of a sound signal, wherein the frequency $\hat{\omega}$ of the missing peaks P_{i+1} to P_{i+N-1} is estimated by linear interpolation between the frequencies of the known peaks P_i and P_{i+N}.

4. A method (1) according to claim 1 or claim 2 for restoring partials of a sound signal, wherein the frequency $\hat{\omega}$ of the missing peaks P_{i+1} to P_{i+N-1} is estimated by linear past prediction.

5. A method (1) according to claim 1 or claim 2 for restoring partials of a sound signal, wherein the frequency $\hat{\omega}$ of the missing peaks P_{i+1} to P_{i+N-1} is estimated by linear future prediction.

6. A method (1) according to claim 1 or claim 2 for restoring partials of a sound signal, wherein the frequency $\hat{\omega}$ of the missing peaks P_{i+1} to P_{i+N-1} is estimated by weighted combination of linear past prediction and linear future prediction.

7. A method (1) according to any preceding claim for restoring partials of a sound signal, further comprising the step of estimating the amplitude of each of the missing peaks P_{i+1} to P_{i+N-1} of the partial by linear interpolation between the amplitudes A of the known peaks P_i and P_{i+N}.

8. A method (1) according to any one of claims 1 to 6 for restoring partials of a sound signal, further comprising the step of estimating the amplitude of each of the missing peaks P_{i+1} to P_{i+N-1} of the partial by linear past prediction.

9. A method (1) according to any one of claims 1 to 6 for restoring partials of a sound signal, further comprising the step of estimating the amplitude of each of the missing peaks P_{i+1} to P_{i+N-1} of the partial by linear future prediction.

10. A method (1) according to any one of claims 1 to 6 for restoring partials of a sound signal, further comprising the step of estimating the amplitude of each of the missing peaks P_{i+1} to P_{i+N-1} of the partial by linear past prediction and linear future prediction.

11. A method (1) according to any preceding claim for restoring partials of a sound signal, wherein the phase correction consists in distributing the phase error $err\varphi$ calculated at the time i+N uniformly between all the missing peaks P_{i+1} to P_{i+N-1} of the partial.

12. A method (1) according to claim 11 for restoring partials of a sound signal, wherein the phase correction is determined by the equation:

$$\hat{\varphi}corrected_{i+n} = \mathrm{mod}\left(\hat{\varphi}_{i+n} + err\varphi\frac{n}{N}, 2\pi\right) \quad n = 1,\ldots,N-1$$

13. A method (1) according to claim 12 for restoring partials of a sound signal, wherein the phase correction is determined using the system of equations:

if $\left|\varphi_{i+N} - \hat{\varphi}_{i+N} + 2\pi\right| < \left|\varphi_{i+N} - \hat{\varphi}_{i+N}\right|$, $err\varphi = \varphi_{i+N} - \hat{\varphi}_{i+N} + 2\pi$,
if $\left|\varphi_{i+N} - \hat{\varphi}_{i+N} - 2\pi\right| < \left|\varphi_{i+N} - \hat{\varphi}_{i+N}\right|$, $err\varphi = \varphi_{i+N} - \hat{\varphi}_{i+N} - 2\pi$,
else $err\varphi = \varphi_{i+N} - \hat{\varphi}_{i+N}$.

14. A sound signal synthesizer for implementing the method according to any preceding claim, characterized in that it comprises:

· means for estimating the frequency $\hat{\omega}$ of each of the missing peaks P_{i+1} to P_{i+N-1} of the partial;

· means for calculating the phase $\hat{\varphi}$ from peak to peak, from the phase of the peak P_i to that of the peak P_{i+N}, for all the frequencies $\hat{\omega}$ previously estimated;

· means for calculating the phase error $err\varphi$ between the calculated phase $\hat{\varphi}$ and the known phase at the same peak P_{i+N};

· means for correcting each calculated phase $\hat{\varphi}$ by a value that is a function of the phase error $err\varphi$.

15. A computer program product loadable directly into the internal memory of a synthesizer or group of synthesizers according to claim 14, the product comprising software code portions for executing steps of a method (1) according to any one of claims 1 to 13 when the program is executed on the synthesizer or group of synthesizers.

16. A medium usable in a synthesizer or group of synthesizers according to claim 14 on which there is stored a computer program product loadable directly into the internal memory of the synthesizer or group of synthesizers, comprising software code portions for executing steps of a method (1) according to any one of claims 1 to 13 when the program is executed on the synthesizer or group of synthesizers.